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## © EPODOC / EPO

PN - JP2000078736 A 20000314  
 TI - WIRING STRUCTURE OF WIRE HARNESS AT ROTARY JOINT  
 FI - B25J19/00&F ; H02G11/00&301B ; H02G11/02&C  
 PA - KOMATSU MFG CO LTD  
 IN - INO TAKAO  
 AP - JP19980248148 19980902  
 PR - JP19980248148 19980902  
 DT - I

## © WPI / DERWENT

AN - 2000-280053 [24]  
 TI - Wiring structure of wire harness in rotary joints of robot machine has rotary joint portion which is made in swirl shape and fixed to arms on both sides rotatably and driven in direction of end of arm mutually  
 AB - JP2000078736 NOVELTY - A rotary joint in the shape of swirl is provided with a hollow material (5). The hollow material is fixed to an arm (2) on one side and secured to the arm (3) on other side by bearing (4). Wire harness (6) is passed through the hollow cavity of hollow joint and arms.  
 - USE - In rotary joints of robot machine like automatic welding machine.  
 - ADVANTAGE - Durability of wire harness is improved by providing twisting and avoiding distortion. Damage of wire harness is prevented by providing guide in arm.  
 - DESCRIPTION OF DRAWING(S) - The figure shows the sectional view of rotation joint.  
 - Arms 2,3  
 - Bearing 4  
 - Hollow material 5  
 - Wire harness 6  
 - (Dwg.3/6)  
 IW - WIRE STRUCTURE WIRE HARNESS ROTATING JOINT ROBOT MACHINE ROTATING JOINT PORTION MADE SWIRL SHAPE FIX ARM SIDE ROTATING DRIVE DIRECTION END ARM MUTUAL  
 PN - JP2000078736 A 20000314 DW200024 H02G11/00 006pp  
 IC - B25J19/00 ;H02G11/00 ;H02G11/02  
 MC - X12-G08  
 DC - P62 X12  
 PA - (KOMS ) KOMATSU SEISAKUSHO KK  
 AP - JP19980248148 19980902  
 PR - JP19980248148 19980902

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PN - JP2000078736 A 20000314

TI - WIRING STRUCTURE OF WIRE HARNESS AT ROTARY JOINT

AB - PROBLEM TO BE SOLVED: To protect a wire harness against torsional deformation even if the turnable range is wide.

- SOLUTION: In a structure for wiring a wire harness 6 from one arm 2 to the other arm 3 supported rotatably with respect to one arm 2 through a rotary joint, a hollow member 5 conducting the hollow sections of both arms is bonded to the rotary joint of one arm 2. The wire harness 6 led out from the hollow section of one arm 2 is passed through the hollow member 5 into the hollow section of the other arm 3 where the wire harness 6 is wound spirally about the axis of the rotary joint. The spiral part is secured, on the inner part thereof, to the hollow member 5 and led out, on the outer part thereof, to the forward end side of the other arm 3 under free state. Subsequently, the wire harness 6 is bent arcuately and turned down to go half round the spiral part and that part is secured to the other arm 3 side and led further led out in the forward end direction thereof.

I - H02G11/00 ;B25J19/00 ;H02G11/02

PA - KOMATSU LTD

IN - INO TAKAO

ABD - 20000922

ABV - 200006

AP - JP19980248148 19980902

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[The technical field to which invention belongs] this invention relates to the \*\*\*\* structure of the wire harness in the rotation joint section of a robot machine which has rotation joints, such as an automatic welding machine.

#### [0002]

[Description of the Prior Art] The above-mentioned robot machine is shown in drawing 1, and the 1st arm 2 is supported possible [ rotation ] to the main part 1, and it is connected with this 1st arm 2 possible [ rotation of the 2nd arm 3 ]. And the wire harness which nose-of-cam work machines, such as a welding torch which is not illustrated at the nose of cam of this 2nd arm 3, are attached, and is connected to this nose-of-cam work machine is wired inside each the 1st and 2nd arm 2 and 3 from the main part 1.

[0003] In the rotation joint section which connects the 1st arm 2 which showed to drawing 2, for example, was made hollow, and the 2nd arm 3, the centrum material 5 has fixed the \*\*\*\* structure of the wire harness in the conventional above-mentioned rotation joint section to the bearing 4 of the 1st arm 2 supported free [ rotation of the 2nd arm 3 ]. The wire harness 6 which \*\*\*\*(ed) in the 1st arm 2 is drawn in the 2nd arm 3 through the inside of this centrum material 5. And when the 2nd arm 3 rotates to the 1st arm 2, the wire harness 6 in this rotation joint section has realized \*\*\*\* by the ability twisting.

#### [0004]

[Problem(s) to be Solved by the Invention] However, a life will become extremely short, if wire harness is weak to torsion from the first and angle of torsion per unit length becomes large. This is disadvantageous to take the large rotation movable range.

[0005] It aims at offering the \*\*\*\* structure of the wire harness in the rotation joint section this invention was made in view of the above-mentioned thing, it is twisted even if the rotation movable range is large, and it was made not to have deformation.

#### [0006]

[Means for Solving the Problem and its Function and Effect] In order to attain the above-mentioned purpose, the \*\*\*\* structure of the wire harness in the rotation joint section concerning this invention The arm by the side of rotation is supported free [ rotation ] in the rotation joint section to the arm by the side of support. In the \*\*\*\* structure of the wire harness in the rotation joint section which was made to \*\*\*\* wire harness to the arm of another side through the centrum of each arm, and the above-mentioned rotation joint section from one arm Fix the centrum material which opens the centrum of both arms for free passage in the rotation joint section of one arm, and draw the wire harness drawn from the centrum of one arm in the centrum of the arm of another side through the inside of the above-mentioned centrum material, and it is set in the arm of this another side. While making it the shape of a swirl to the axial center of the rotation joint section, the inside portion of this swirl section is fixed to the above-mentioned centrum material. After drawing the lateral part of the above-mentioned swirl section in the free state to the nose-of-cam side of the arm of another side, while curving circularly, turning up and going half round the outside of the above-mentioned swirl section, this portion is fixed to the arm side of another side, and it has composition further derived in the direction of a nose of cam of the arm of another side.

[0007] According to the composition, when the arm of another side rotates one arm, the wire harness which passes along the rotation joint section with which both this arm is connected free [ rotation ] is rewound in the portion made into the shape of a swirl, or deformation of contamination is made.

[0008] For this reason, even if the wire harness in this rotation joint section rotates over the rotation movable range with each big arm, it is twisted, deformation of it is lost, the life of the wire harness by rotation of an arm is short, and the bird clapper of it is lost.

[0009] Moreover, in the \*\*\*\* structure of the wire harness in the rotation joint section in the above-mentioned composition, while preparing the part in centrum material, preparing the notch \*\*\*\* guidance cylinder centrum material and in the shape of one and arranging wire harness in the shape of a swirl outside through the notch from the inside of this guidance cylinder, the periphery side of the above-mentioned swirl section was guided in the interior material of a proposal.

[0010] According to this composition, the swirl section of wire harness is guided by the guidance cylinder, and rewinding [ of the swirl section at the time of rotation of an arm ] and contamination operation are performed smoothly.

[0011] Furthermore, in the \*\*\*\* structure of the wire harness in the rotation joint section in the above-mentioned composition, since it showed in the guide the portion drawn and turned up from the swirl section of wire harness to the longitudinal direction of the arm of another side, the bend which deforms in the curve direction, is rewound and involved in it by rotation of an arm, and changes length is guided in the interior material of a proposal, and can prevent breakage of the variant part of this wire harness.

[0012]

[Embodiments of the Invention] The gestalt of operation of this invention is explained below based on drawing 3. In addition, the thing of the same composition as the Prior art shown by drawing 1 and drawing 2 attaches and explains the same sign.

[0013] The 2nd arm 3 is supported free [ rotation ] to the 1st arm 2 by the bearing 4 prepared in the 1st arm 2. To the bearing 4 of the 1st arm 2, the centrum material 5 has fixed by carrying out at the shape of \*\*\*\*\*. The flange 8 is formed in the portion which faces in the 2nd arm 3 of the centrum material 5, and the cylinder-like guidance cylinder 9 is set up to this flange 8. It is a part of this guidance cylinder 9, and the notch 10 is formed in the extension direction side of the 2nd arm 3 to the 1st arm 2.

[0014] To the periphery side of the guidance cylinder 9, as a periphery side estranges in the position which counters the outside peripheral surface of the guidance cylinder 9 more slightly than a part for the thickness of wire harness 6, it whirls in it, and two or more section guidance rollers 11 are formed in it in support of the 2nd arm 3 side.

[0015] It is the inside of the 2nd arm 3, and two or more pars intermedia guidance rollers 12 open an interval in the longitudinal direction of an arm, and are formed in the crosswise unilateral section of an arm. Moreover, the outside clip 13 which is the flank besides the cross direction of an arm, and supports wire harness 6 on the guidance cylinder 9 outside ranging from the above-mentioned pars intermedia guidance roller 12 and the position to the mechanical component circumference which counters fixes to the 2nd arm 3 side, and are formed. [ two or more ] Moreover, two or more inside clips 14 which support the wire harness 6 led from the centrum material 5 inside the above-mentioned guidance cylinder 9 along with the inner circumference of the guidance cylinder 9 are formed.

[0016] In the above-mentioned composition, the wire harness 6 drawn in the 1st arm 2 is drawn in the 2nd arm 3 through the centrum material 5 of the rotation joint section. At this time, the wire harness 6 drawn from the centrum material 5 After making it curve along with the inner circumference of the guidance cylinder 9 first, take out to the outside of the guidance cylinder 9 and it is made to curve along with the periphery of this guidance cylinder 9 from the notch 10 of this. Subsequently, after drawing covering a certain length in the direction of a nose of cam of the 2nd arm 3, it bends circularly, and it \*\*\*\* so that it may go half round the circumference of the rotation joint section of the 2nd arm 3 and may be led to the longitudinal direction of the 2nd arm 3.

[0017] And the wire harness 6 of the portion in alignment with the inner circumference of the guidance cylinder 9 is fixed to the guidance cylinder 9 side with the inside clip 14 at this time.

Moreover, the wire harness drawn from the inner circumference side of the guidance cylinder 9 at the periphery side of this is guided so that the periphery side of the guidance cylinder 9 may be accompanied with the swirl section guidance roller 11 formed in the 2nd arm 3 side. Furthermore, the portion which goes half round the circumference of the rotation joint section of the 2nd arm 3 is fixed to the 2nd arm 3 side with the outside clip 13.

[0018] And the direction derived along with the periphery of the guidance cylinder 9 of this wire harness 6 carries out the curve direction of the wire harness 6 derived from the centrum material 5 at this time to the guidance cylinder 9 in the direction (seeing from the upper part with the gestalt of this operation the direction of counterclockwise twining) suitable for the pars intermedia guidance roller 12.

[0019] Therefore, from the centrum material 5 of the 1st arm 3 which is a support side, the wire harness 6 \*\*\*\*(ed) by the rotation joint section of both the arms 2 and 3 is drawn upwards, and is curved and fixed to the hand of cut of the 2nd arm 3 along with the inner skin of the guidance cylinder 9 fixed to the 1st arm 2 side which is a support side. And the portion drawn from the notch 10 of the guidance cylinder 9 to the periphery side of the guidance cylinder 9 is pressed down with the rotation joint section guidance roller 11, curves along the periphery side of the guidance cylinder 9, and is drawn from the portion which separates from this rotation joint section guidance roller 11 in the direction of a nose of cam of the 2nd arm 3. At this time, since wire harness 6 is drawn by the tangential direction of the guidance cylinder 9, it is contacted by the pars intermedia guidance roller 12 which it was drawn towards crosswise one side of the 2nd arm 3, and was formed in this derivation place, and is guided at the longitudinal direction of the 2nd arm 3.

[0020] Furthermore, this wire harness 6 is circularly turned up from the portion which contacts the pars intermedia guidance roller 12, goes half round the rotation joint section, and is drawn to the nose-of-cam side of the 2nd arm 3. And in this rotation joint section, it is fixed to the 2nd arm 3 side with the outside clip 13.

[0021] Thus, the wire harness 6 drawn from the centrum material 5 of the arm 2 by the side of support While the rotation base of the arm 3 by the side of rotation \*\*\*\* in the shape of a swirl to the center of rotation It is fixed to the 1st arm 2 side whose base side of this swirl section is a support side, and the portion drawn from this portion curves in the free state within the 2nd arm 3 which is a rotation side, is turned up again to a joint section side, goes half round the rotation joint section in the state where it was fixed to this, and is led to the nose-of-cam side of the arm 3 by the side of rotation. Although the gestalt of this operation showed the example which looked at the above-mentioned swirl direction from the upper part, and was made into counterclockwise twining, you may make this into clockwise twining. In this case, the pars intermedia guidance roller 12 is formed in the crosswise opposite side of the 2nd arm 3.

[0022] Where wire harness 6 is \*\*\*\*(ed) as mentioned above, when the 2nd arm 3 which is an arm by the side of rotation was rotated the right and leftward, respectively, the chain line of drawing 4 came to have shown.

[0023] That is, if the 2nd arm 3 is rotated rightward 240 degrees, for example, wire harness 6 will come loose in the swirl section of the rotation base in a counterclockwise twining state, and will be lengthened by the longitudinal direction of an arm 3.

[0024] Moreover, leftward, the wire harness 6 which is in a counterclockwise twining state when it rotates 60 degrees deforms the 2nd arm 3 in the direction rolled round by the guidance cylinder 9, it is bent, and is carried out, and a bend becomes short.

[0025] Although the wire harness 6 of the rotation joint section deforms when the 2nd arm 3 rotates in both directions as mentioned above, deformation of the wire harness at this time is curve deformation to the hand of cut of the 2nd arm 3, it is twisted, and deformation is not carried out. Moreover, the unilateral section of the cross direction of the clinch bend of this wire harness 6 is guided with the pars intermedia guidance roller 12. Moreover, the free state portion of the swirl section of a rotation base is guided with the rotation section guidance roller 11.

[0026] What drawing 5 and drawing 6 show the gestalt of other operations of this invention, and was shown in drawing 5 replaces the outside of the swirl section of wire harness 6 with a roller, and guides it in rotation joint section guide plate 11a, and the example which replaces pars intermedia with a roller similarly and was guided in pars intermedia guide plate 12a is shown.

[0027] Moreover, what [redacted] shown in drawing 6 shows the example which omitted the guidance cylinder 9 shown by drawing 3. In this case, the outside swirl section is guided at the swirl section of the inside fixed with the inside clip 14.

[0028] In addition, in the mode of each above-mentioned implementation, the pars intermedia guidance roller 12 and especially pars intermedia guide plate 12a may not be.

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CLAIMS

[Claim(s)]

[Claim 1] The arm by the side of rotation (3) is supported free [ rotation ] in the rotation joint section to the arm by the side of support (2). In the \*\*\*\* structure of the wire harness in the rotation joint section which was made to \*\*\*\* wire harness (6) to the arm of another side through the centrum of each arm, and the above-mentioned rotation joint section from one arm The centrum material (5) which opens the centrum of both arms for free passage in the rotation joint section of one arm is fixed. While drawing the wire harness drawn from the centrum of one arm in the centrum of the arm of another side through the inside of the above-mentioned centrum material and making it into the shape of a swirl to the axial center of the rotation joint section into the arm of this another side After fixing the inside portion of this swirl section to the above-mentioned centrum material and drawing the lateral part of the above-mentioned swirl section in the free state to the nose-of-cam side of the arm of another side, while curving circularly, turning up and going half round the outside of the above-mentioned swirl section \*\*\*\* structure of the wire harness of the rotation joint section characterized by fixing this portion to the arm side of another side, and making it derive in the direction of a nose of cam of the arm of another side further.

[Claim 2] While preparing a part in centrum material (5), preparing a notch \*\*\*\* guidance cylinder (9) centrum material and in the shape of one and arranging wire harness (6) in the shape of a swirl outside through a notch (10) from the inside of this guidance cylinder (9) \*\*\*\* structure of the wire harness in the rotation joint section according to claim 1 characterized by guiding the periphery side of the above-mentioned swirl section in the interior material of a proposal (11 11a).

[Claim 3] \*\*\*\* structure of the wire harness in the rotation joint section according to claim 1 or 2 characterized by showing in a guide the portion drawn and turned up from the swirl section of wire harness to the longitudinal direction of the arm of another side.

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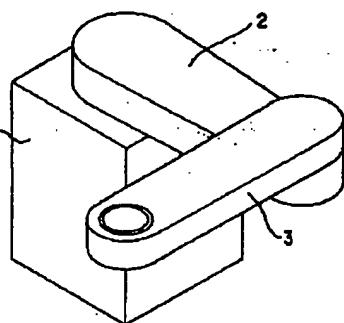
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DRAWINGS

[Drawing 1]

面筋型のロボット機械の一例を概略的に示す斜視図

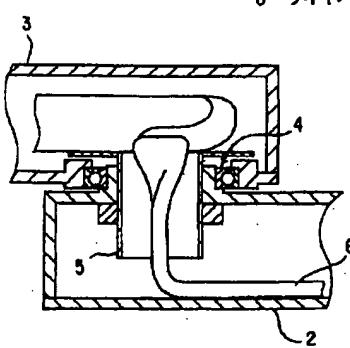
1…本体  
2…第1アーム  
3…第2アーム



[Drawing 2]

従来例を示す断面図

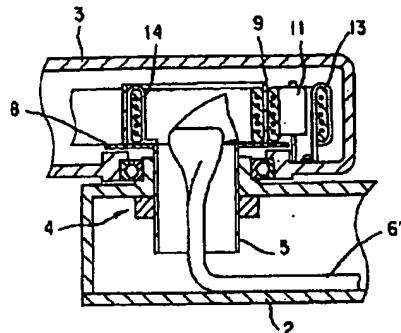
2…第1アーム  
3…第2アーム  
4…軸受部  
5…中空部材  
6…ワイヤハーネス



[Drawing 3]

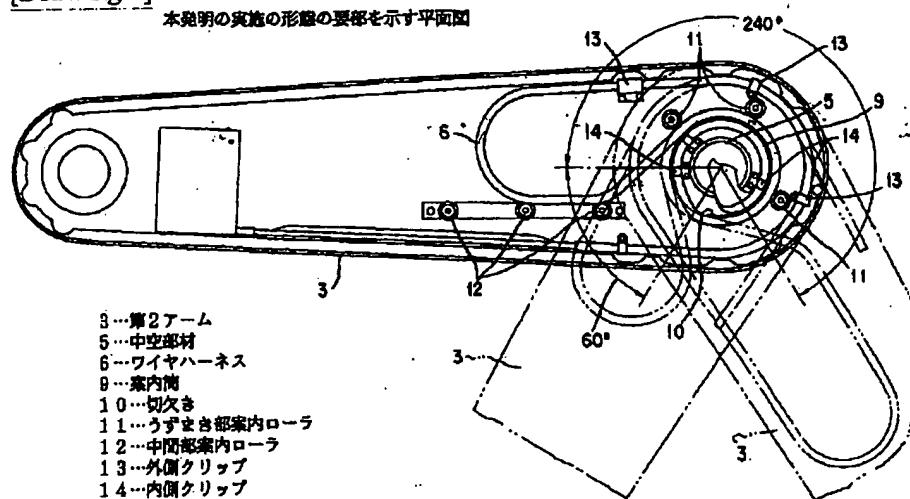
## 本発明の実施の形態を示す断面図

2…第1アーム  
3…第2アーム  
4…軸受部  
5…中空部材  
6…ワイヤハーネス  
8…フランジ  
9…案内筒  
11…うずまき部案内ローラ  
13…外側クリップ  
14…内側クリップ



[Drawing 4]

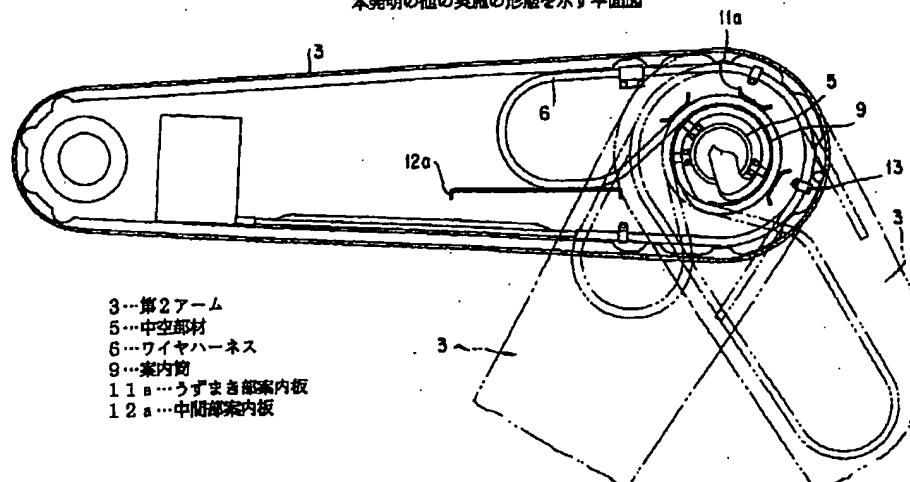
## 本発明の実施の形態の要部を示す平面図



3…第2アーム  
5…中空部材  
6…ワイヤハーネス  
9…案内筒  
10…切欠き  
11…うずまき部案内ローラ  
12…中間部案内ローラ  
13…外側クリップ  
14…内側クリップ

[Drawing 5]

## 本発明の他の実施の形態を示す平面図

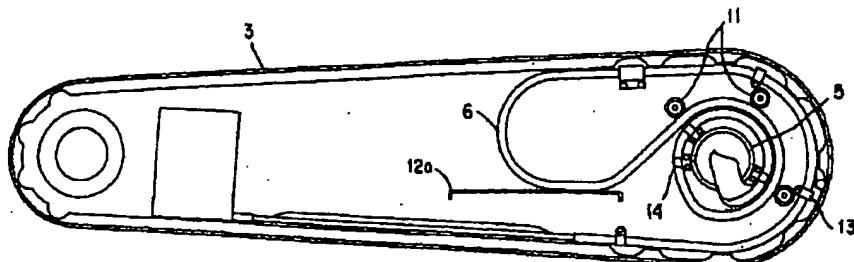


3…第2アーム  
5…中空部材  
6…ワイヤハーネス  
9…案内筒  
11a…うずまき部案内板  
12a…中間部案内板

## [Drawing 6]

本発明の他の実施の形態を示す平面図

- 3…第2アーム
- 5…中空部材
- 6…ワイヤーホース
- 11…うずまき部案内ローラ
- 12a…中間部案内板
- 14…内側クリップ



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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the perspective diagram showing an example of a joint type robot machine roughly.

[Drawing 2] It is the cross section showing the conventional example.

[Drawing 3] It is the cross section showing the gestalt of operation of this invention.

[Drawing 4] It is the plan showing the important section of the gestalt of operation of this invention.

[Drawing 5] It is the plan showing the gestalt of other operations of this invention.

[Drawing 6] It is the plan showing the gestalt of other operations of this invention.

### [Description of Notations]

- 1 -- Main part
- 2 -- The 1st arm
- 3 -- The 2nd arm
- 4 -- Bearing
- 5 -- Centrum material
- 6 -- Wire harness
- 8 -- Flange
- 9 -- Guidance cylinder
- 10 -- Notch
- 11 -- Swirl section guidance roller
- 11a -- Swirl section guide plate
- 12 -- Pars intermedia guidance roller
- 12a -- Pars intermedia guide plate
- 13 -- Outside clip
- 14 -- Inside clip

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[Translation done.]